

## SINOPROBE Deep Seismic Reflection Profiling across the Bangong-Nujiang Suture, Central Tibet

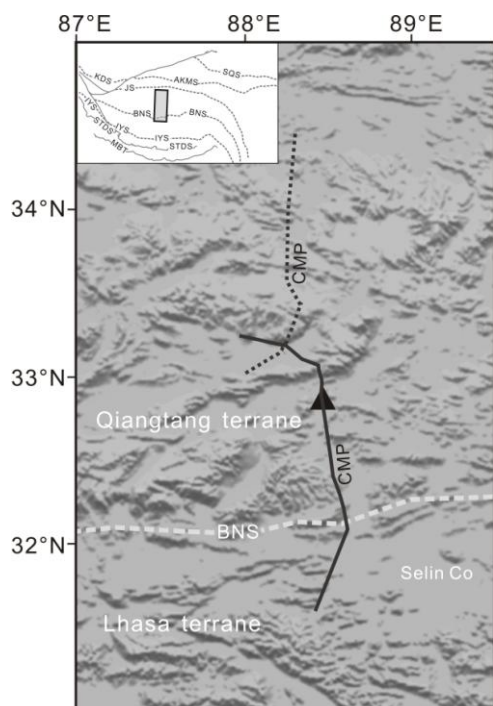
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Exploring the composition and structure of the overthickened crust of the Tibetan plateau is fundamental to unravelling the mechanisms of uplift of the Tibetan plateau. Deep seismic reflection profiling is a well recognized technique to reveal the fine structure of continental lithosphere. INDEPTH deep reflection profiling in the southern Tibetan plateau imaged the Main Himalayan Thrust beneath which the Indian plate underthrusts beneath the Himalaya (Zhao and others, 1993), and also the Moho beneath the great crustal thickness of the Himalayan orogen. However, deep reflection profiling within the interior of the Tibetan plateau was too limited to image lower-crustal structure across the Bangong-Nujiang suture (BNS) (Ross and others, 2004), perhaps due to partial melting in the lower crust of the Lhasa Block (LB) (Nelson and others, 1996). The BNS resulted from collision of the LB and Qiangtang block (QB) in the late Jurassic, but may have been reactivated by subsequent strike-slip faulting (Meissner and others, 2004). The QB may be the location of the boundary between the Indian plate and Eurasian plate at lithospheric depths down to 200 km (Zheng and others, 2007). Thermal effects of mantle upwelling maybe the primary cause of the low Pn velocity and the shallower Moho depth in this region. The E-W trending Qiangtang central uplift in the interior of the QB and the convergent structure beneath the west Kunlun orogenic belt (Gao and others, 2000) suggest that the Qiangtang central uplift may be associated with continent-continent collision.

With funding from project “SINOPROBE-02” and the China NSF (40830316), we are currently acquiring a 300-km long deep seismic reflection profile across the BNS and the Qiangtang central uplift (Fig. 1). The reflection profile is a nominal 72-fold common-midpoint (CMP) stack profile, recorded with a 720-channel Sercel 408 XL. The seismic sources are nominal 50-kg charges in boreholes ~30 m deep at intervals of 250 m, and additional charges of 200 kg every 1 km and 1000 kg every 50 km, in boreholes ~50 m deep. All data was recorded to 30 seconds (60s for the 1000 kg shots) using a geophone group interval of 50 m. A maximum far offset of 48 km was used to record the 1000-kg shots.

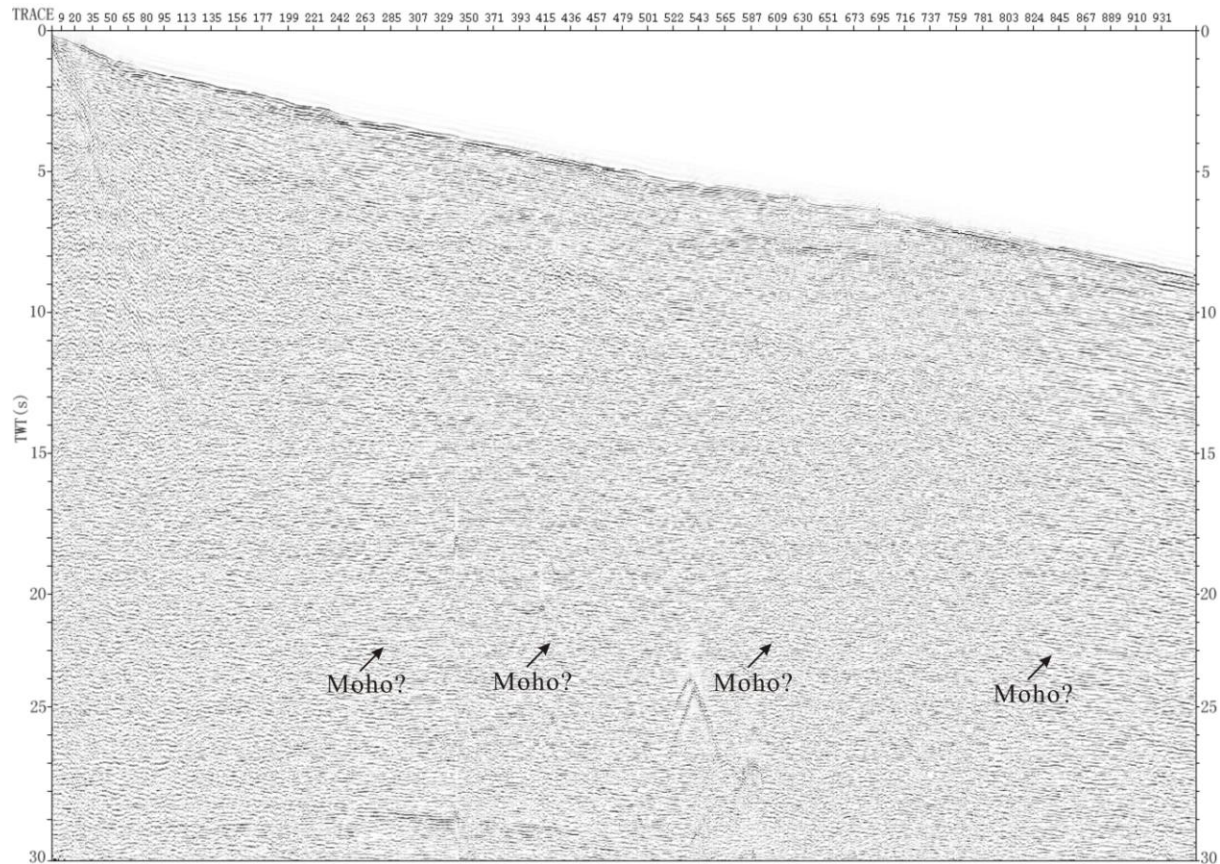


Compared to previous profiles in the QB (Lu and others, 2009), this SINOPROBE profiling achieved deeper shot holes (~50 m), used larger charges (1000 kg), and recorded to longer offsets (~50 km). These measures clearly improved the quality of the acquired data, and allowed reflections to be recorded from the lower crust. Figure 2 shows raw data from a single large shot, with a reflection at 22s presumed to be the Moho.

After initial processing, including elevation (statics) corrections, de-noising to improve signal-to-noise ratio, filtering of surface waves, surface-consistent deconvolution, velocity analysis and residual static corrections, a preliminary 93-km long stack-section shows that: (1) beneath the

**Figure 1.** Location of the Sinoprobe seismic reflection profile (CMP) from the west side of Selin Co northward into the Qiangtang terrane. Tectonic setting after Yin and Harison (2000). Solid black line: acquired data; dotted line: acquisition in progress. BNS: Bangong-Nujiang suture. ▲ locates shot 626 (Fig. 2).

southernmost part of the profile, there are two sets of strong northward-dipping reflectors at 10 s and 19 s TWT respectively, which suggest that the LB may underthrust beneath the BNS; (2) there is a well-developed northward thrust beneath the shallow part of the BNS; (3) a broad, open fold is imaged south of the BNS at 10 s that shallows to ~ 7 s beneath the BNS; (4) the Moho reflector at 22 s indicates little change in Moho depth across the BNS. As our experiment proceeds, new data further north in the QB will provide an improved crustal image of the collision between the LB and the QB.



**Figure 2.** Shot 626 (1000 kg explosive) Moho reflection at 22s TWT. The record was filtered from 3Hz to 15Hz.

## References

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